AFP Imaging Corporation
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IMAGE-VET 70 ACP

Installation, Operation
&
Service Manual

Veterinary Diagnostic X-ray Unit
With Anatomical Timer Control

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P/N 897-000022

IMPORTANT!
BEFORE INSTALLATION

These instructions describe the installation, operation and maintenance procedures for the Image-Vet 70ACP veterinary X-ray system. One purpose of this manual is to provide the user with instructions that will permit the equipment to run safely and efficiently. The Image-Vet 70ACP must be used according to the procedures in the manual and never for purposes other than the ones for which it has been designed. Please read the operation instructions, Section A of this manual in its entirety before attempting to take any radiographs of a patient. The Image-Vet 70ACP is intended solely for veterinary applications and for use by a qualified and licensed veterinarian or technician. These instructions apply to all the versions of the Image-Vet 70ACP X-ray equipment as well as various accessories that may be provided. For this reason, the description of some parts may not correspond or be applicable to your equipment.

The manufacturer or its representative shall provide authorized service to meet the stated performance standard information as required for the timer or tubehead.

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All information, specifications and illustrations contained herein are subject to change.

AFP Imaging Corp. has a company policy of continual development. Therefore, it reserves the right to make changes without prior notice.

AFP's limited warranty obligations apply to, but are not limited by the following conditions:

1) Damage incurred due to improper wiring or connections are excluded.
2) The installation must be carried out by authorized personnel.
3) The installation must be completed in accordance with the diagrams supplied by the manufacturer.
4) An independent earth ground wire is required for electrical safety with main power input wiring.

Important: An electrical source must be provided with + or - 3% regulation which includes a fuse or circuit breaker rated for 120/220 VAC, 15 Amps.

ABOUT THIS PRODUCT...

Performance

The Image-Vet 70ACP X-ray system is designed for use in veterinary dental radiography. It is an AC type X-ray system that houses both the high voltage transformer and tube insert in a compact tubehead assembly. This assembly is supported by a spring loaded articulating arm that is balanced to provide smooth movement and positioning of the tubehead in a variety of positions.
The positioning arm is atttached to a pivoting extension arm that, in turn, is attached to a wall mounted plate. A remote exposure control providing voltage to the tubehead is wall mounted and provides for precisely timed exposures.
The system provides for X-ray exposures on a variety of media from film to CCD or CMOS digital sensors to PSP (Photo Stimulated Phosphor) plates.

The system is designed and manufactured to perform in accordance with the manufacturer's certification, which is based upon FDA regulations for X-ray sources and International IEC standards.
Performance qualification criteria is available from the manufacturer.
This device is for veterinary use only and is not certified for human application.

Disposal

The Image-Vet 70ACP Intraoral X-ray System, (except for the tubehead), may be disposed of by any means appropriate for the discard of electro-mechanical devices.

The Image-Vet 70ACP X-ray tubehead contains mineral oil, which is classified as a special by-product. Therefore, when the tubehead is to be taken out of service, it should be sent back to the manufacturer or given to a firm authorized to dispose of the mineral oil.

REVISION RECORD

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INSPECTION RECORD

Inspection	Effective Date	Description/Notes
01		
02		
03		
04		
05		

SECTION A: OPERATORS MANUAL
Image-Vet 70*ACP*

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A1. Warning Symbols & Labelling

Pay careful attention to the symbols contained herein and on the equipment.

Certain instructions are preceded by **Warning!** with a triangle at the side. Whenever this symbol appears, carefully read the relevant paragraph before performing any operations. See symbol #2

Definitions of symbols used:

1) Degree of protection when coming directly or indirectly into contact with live electrical parts. (Class I, Type B)

2) CAUTION! Consult the technical documentation provided.

3) Earth ground connection

4) Alternating current

5) On

6) Off

7) Source of radiation

8) Radiation exposure control

9) Ionizing radiation warning

10) Equipment which conforms with the EEC Directive 93/42 standards

11) I.M.Q. kite mark

12) CSA Mark

1

2

3

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12

Before leaving the operatory, turn the main switch to the “Off” position.

The equipment is not liquid-proof. Do not immerse components.

The equipment is not suitable for use in the presence of flammable anaesthetic gas based on oxygen and nitrous oxide.

WARNING!

If electrical equipment which does not comform with local codes for shielding and isolation and/or FCC Part 15 of the FCC rules for class A computing devices is used in operatories and/or nearby, interferences and/or disturbances may arise thus causing the X-ray equipment to malfunction.

In this case, DISCONNECT the X-ray equipment before using any other instrument or device.

The limited warranty will be voided if the following precautions are not taken:

· Assembly, servicing and modifications to the equipment should only be carried out by AFP Corp. authorized technicians.

· Observe the conditions specified in the limited warranty certificate itself.

· The electrical supply wiring in the room where the equipment is installed must conform with the National Electrical Council (NEC) specifications or other local electrical codes (i.e. the regulations concerning the electrical wiring to be used in operatories).

· The room where the X-ray equipment is installed must conform with the regulations, concerning protection against radiation, in force in the locality where the equipment is used.

Assembly, repairs, modifications, adjustments and any other operations which involve gaining access to the inside of the equipment must only be carried out by AFP Corp. authorized technicians or representatives.

A1.1. Ambient conditions

The place where the equipment is to be installed should satisfy the following conditions:

a) Temperature between 50° and 105° F (10° and 40° C)

b) Relative humidity from 30 to 75%

c) Atmospheric pressure from 700 to 1060 hPa.

A1.2. Purpose of the equipment

The Image-Vet 70*ACP* veterinary dental X-ray system is designed for radiographic diagnosis in the field of veterinary dentistry. Operation of this equipment must be under the direction or supervision of a licensed veterinarian.

WARNING!

The Image-Vet 70*ACP* X-ray tubehead contains mineral oil, which is classified as a special by-product. Therefore, when the tubehead is to be taken out of service it should be sent back to the manufacturer or given to a firm authorized to dispose of the mineral oil.

A1.3. Improper use

The Manufacturer declines all responsibilities if:

Installation, adjustment, repairs and modifications are carried out by persons who have not been authorized by AFP Corp.

The electrical system which serves the X-ray equipment does not conform with local electrical codes.

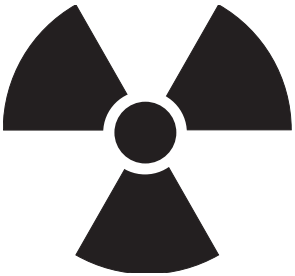
The equipment is not used as outlined in this manual.

A1.4. Protection against radiation

WARNING!

X-rays are harmful if improperly used. Therefore, the instructions contained herein must be strictly observed. After installation, the installer should perform a radiation test emission procedure to check the equipment for proper operation.

All instuctions concerning operations during which X-rays are emitted will be preceded by this symbol to remind the user of the precautions to be taken, as recommended by local regulations.



General precautions for protection against X-rays.

- Operator control X-ray emission from a distance of at least 6 feet from the focal spot of the X-ray.
- Reduce the radiation level to which patients and operating personnel are exposed.
- During X-ray emissions, only the operating personnel and the patient should be present.
- The veterinarian should wear a protective apron, etc., when necessary.

A1.5 Compliance with current USA and International standards and regulations

CDRH/FDA

The components of this device have been certified by the manufacturer to be in compliance with FDA regulations as per 21 CFR SUBCHAPTER J as ammended, for veterinary applications. This model is not for human use.

International X-ray Standards

CEI 62-5+A11+A12+A13+Amend.2

General safety regulations concerning electrical medical equipment.

CEI 62-67

Safety standards for X-ray tubeheads.

CEI EN 60601-1-2

Additional safety regulations concerning electro-magnetic compatibility: Recommendations and testing.

CEI EN 60601-1-3

General safety regulations.
General recommendations for protection against X-rays when the equipment is used for diagnostic purposes.

CEI EN 60601-1-4

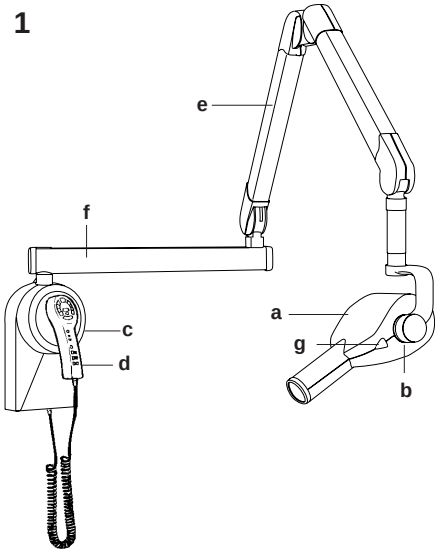
General safety regulations for SW logic programmable equipment.

CEI EN 60601-2-28

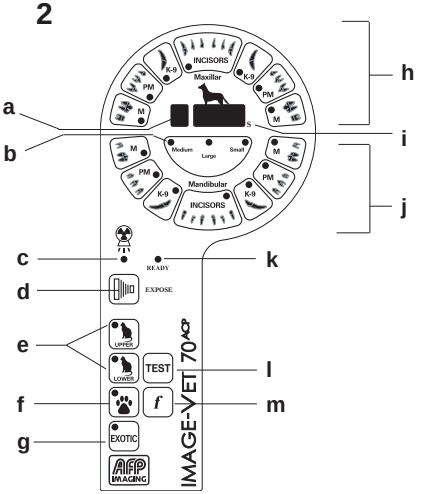
Specific safety regulations for X-ray equipment and tube assemblies for medical diagnostics.

A2. Description of the Image-Vet 70*ACP* X-ray equipment

1



2



1. Description of the X-ray system

a) X-ray Tubehead/Tubehead Assembly
b) Dial, angulation
c) Timer/Wall-mount pivot assembly
d) Hand held control
e) Double-jointed scissors arm
f) Extension arm
g) Focal spot location (Wall mounting plate not shown)

2. Description of the hand held X-Mind control unit

a) Display, Film sensitivity (1 to 9) or Xray tubehead selected (A or B)
b) Patient's jaw size selection
c) Warning light, X-ray emissions
d) Button, Exposure start
e) Upper and lower cat selections
f) Paw select
g) Exotic select
h) Upper dental arch (for dogs)
i) Exposure time display
j) Lower dental arch (for dogs)
k) "Ready" light, pre X-ray emission
l) Service test control
m) Film/Sensor sensitivity level (Scroll button)

Double-jointed scissors arm

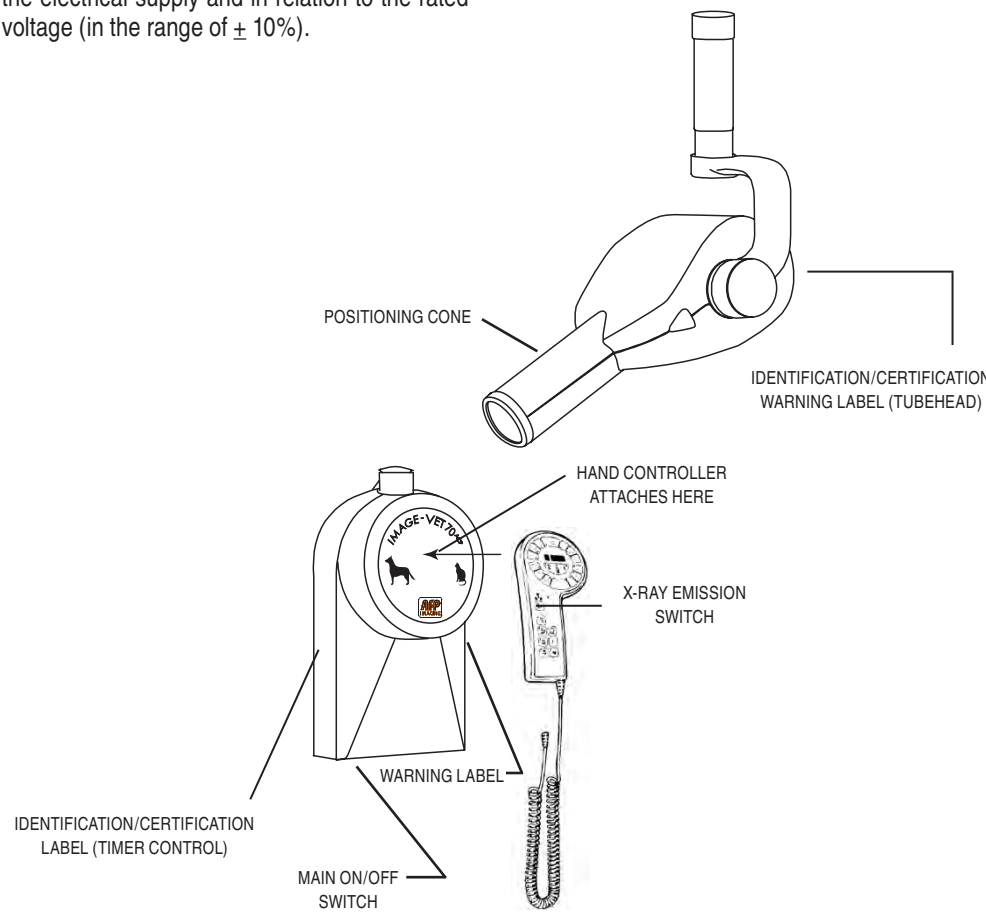
This is a double-jointed arm which carries the X-ray tubehead. It can be extended or retracted and moved up and down while keeping the tube-head balanced in the position it has reached. An additional extension arm is attached to the arm which is available in three different lengths: 15.75 in (40 cm), 23.6 in (60 cm) or 34.25 in (87 cm).

Micro-processor X-Mind control panel

The microprocessor-based control system is used to automatically set the exposure time from a minimum of 0.02 s to a maximum of 1.28 s. The electronic controller automatically determines the exposure time according to the changes in the electrical supply and in relation to the rated voltage (in the range of ± 10%).

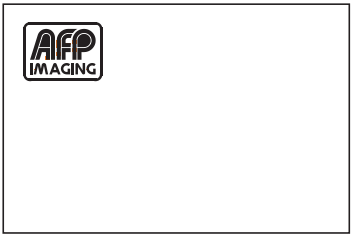
X-ray tubehead with collimator

The X-ray tubehead is self-contained and due to its operating characteristics, the exposure time can be reduced so that less radiation is absorbed by the patient. Moreover, the tubehead is provided with a positioning cone capable of operating at a minimum skin/focus distance of 7.88 in (20 cm); the maximum diameter of the X-ray beam is 2.36 in (6 cm). The X-ray tubehead is attached to the arm in such a way as to permit unlimited rotation. With this arrangement it can be rotated 360° on its horizontal plane while the rotary movements on the vertical plane are limited by the positioning cone.



A2.1. Nameplates

1



(1) X-ray tubehead nameplate

The name plate is located on the back of the tubehead. The following details are given on the name plate:

· Manufacturer

· Name of equipment

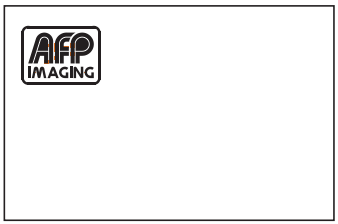
· Serial number

· Tube insert number

· Specifications

· Month and Year of manufacture

2



(2) X-Mind control unit nameplate

This plate is located on the left side of the controller. The following details are given:

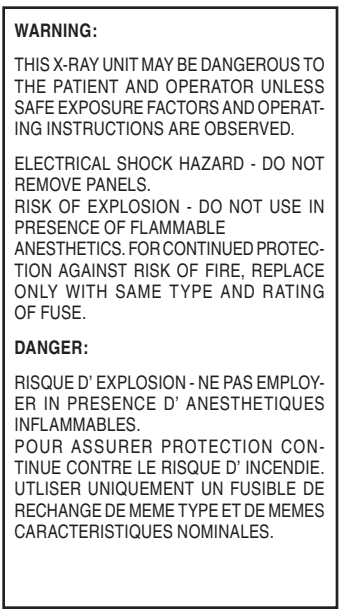
· Name of equipment

· Serial number

· Specifications

· Month and Year of manufacture

3


WARNING:
THIS X-RAY UNIT MAY BE DANGEROUS TO THE PATIENT AND OPERATOR UNLESS SAFE EXPOSURE FACTORS AND OPERATING INSTRUCTIONS ARE OBSERVED.
ELECTRICAL SHOCK HAZARD - DO NOT REMOVE PANELS.
RISK OF EXPLOSION - DO NOT USE IN PRESENCE OF FLAMMABLE ANESTHETICS. FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE.
DANGER:
RISQUE D' EXPLOSION - NE PAS EMPLOYER IN PRESENCE D' ANESTHETIQUES INFLAMMABLES.
POUR ASSURER PROTECTION CONTINUE CONTRE LE RISQUE D' INCENDIE. UTLISER UNIQUEMENT UN FUSIBLE DE RECHANGE DE MEME TYPE ET DE MEMES CARACTERISTIQUES NOMINALES.

(3) X-Mind control warning nameplate

The nameplate is on the right side of the timer.

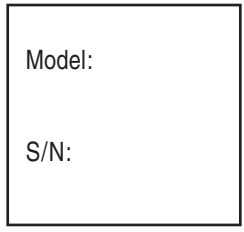
(4) Scissors & Extension Arms

These nameplates contain:

· Model number

· Serial number

4



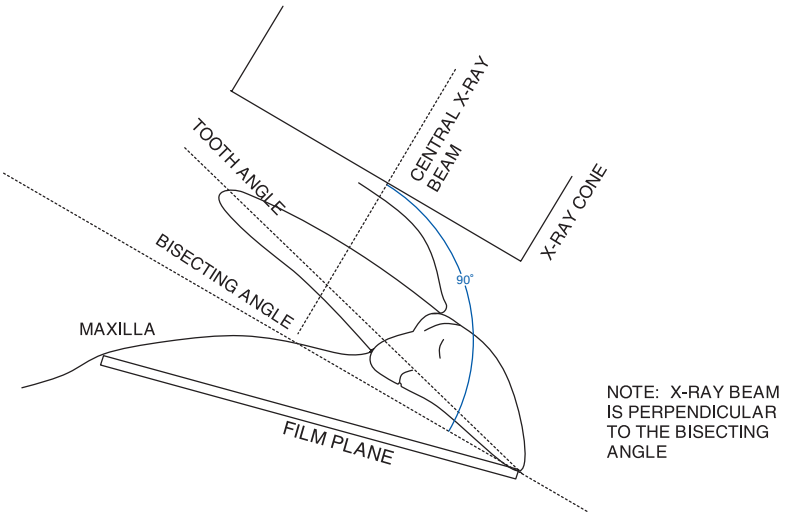
A3. Basic applications of the Image-Vet 70ACP

A3.1. Basic patient position

The patient should be positioned on the table in whatever position that is appropriate for the radiograph to be taken.

A3.2. Positioning the X-ray tubehead assembly

Position the tubehead by moving the double-jointed scissors arm so as to bring the collimator into contact with the patient's skin at the point where the radiograph is to be made. The X-ray tubehead is set to the correct position by using the bisecting angle technique



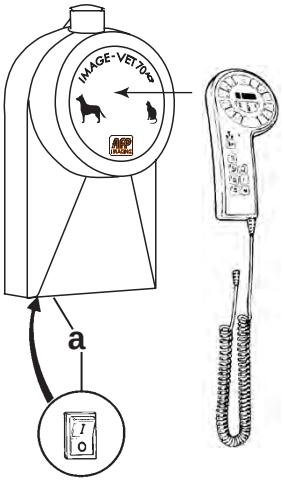
A3.2.1. Bisecting angle technique

a) Vertical incidence angle of the main beam:

In order to obtain a precise image of the tooth, the main beam must be perpendicular to the bisector of the angle created between the longitudinal axis of the tooth and of the film. Having positioned the tube head and the film, as said above, an average incidence angle can be used for each area. The incidence angle of the main beam can be determined by using the graduated scale located on the bracket of X-ray tube. The diagram at the side shows an example of positioning the X-ray cone using the bisecting technique.

A3.2.2. Interproximal radiographs

To carry out this type of radiograph, the tubehead must be perpendicular to the surface of the film.



A3.3. Turning on the X-Mind control

Use the main switch (a) to turn ON the control unit. The green light built into the switch will come ON to indicate that power is being delivered to the control unit.

IMPORTANT

Each time the unit is turned ON, the equipment runs a test which lasts 10 seconds. During this time, no radiographs will be produced.

All the indicator lights come on and “8 8.88” will be temporarily shown on the display.

A3.3.1. Display status

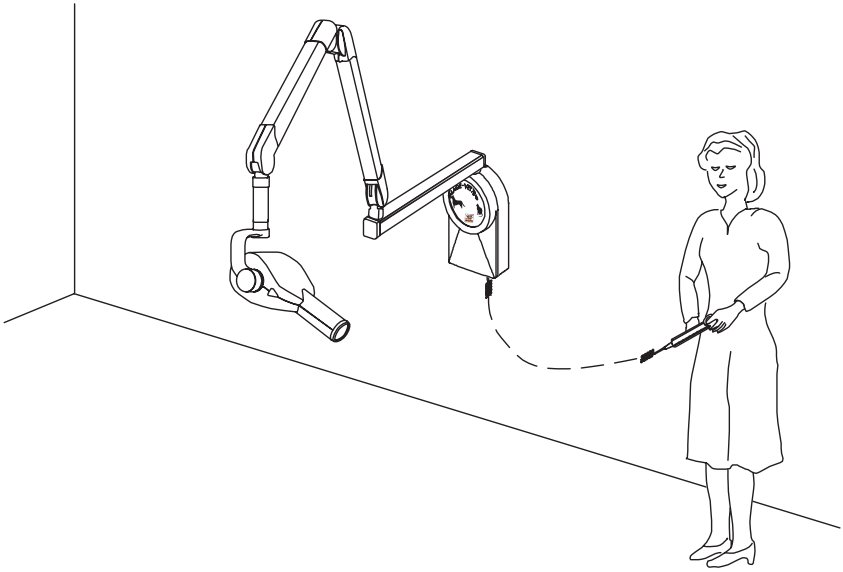
After the equipment is turned on and the initial test has run, the display shows the selected sensitivity for the film.

A3.4. Factory settings

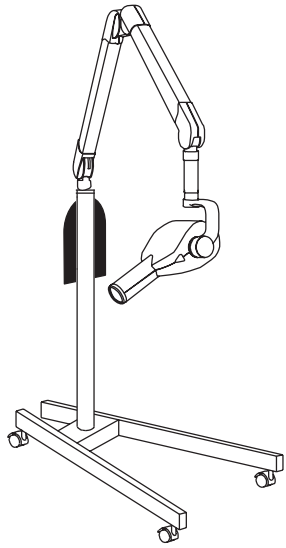
Factory settings are determined when the equipment is installed and can only be modified by AFP Imaging Corp. authorized technicians.

Always prepare before exposure with appropriate protective shields, aprons or equivalent devices to protect from unnecessary radiation.

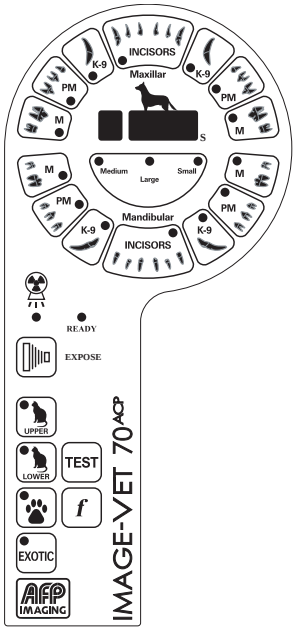
Typical Wall Mounting



Typical Mobile Mounting



X-Mind Hand Held Selector



Film Sensitivity Select

X-ray Exposure Start

A3.5. Setting the exposure time

To set the radiation exposure time, the following operations must be carried out:

· Press the key corresponding to the type of dog tooth being radiographed. Otherwise press the key for upper or lower cat jaw radiographs or the ones for paw or exotic radiographs. The light built into the key that has been pressed will light-up.

· Press the key which corresponds to the jaw or part size of the patient. i.e.
a Small or light jaw
b Medium or average jaw (default)
c Heavy or dense jaw

· Set the sensitivity level for the film used (see page 16) by using the (f) key.

WARNING!

The green Ready light comes on to indicate that the equipment is ready for emitting X-rays.

· **Move to a shielded or safe location before exposure. Use caution in the area where the X-rays are to be emitted.** Press the exposure control button and hold it down. The yellow light will come on together with an audible warning device which will continue sounding until the X-ray emission has been completed.

IMPORTANT!
SAFETY FEATURE

The exposure control button must be held down during the entire exposure! If the button is released prematurely, X-ray emission is interrupted and the radiograph may be underexposed.

Selecting film sensitivity with the **key:**

NOTE: A setting of 2 - 3 for film sensitivity is a good range for Kodak Insight (F) speed film OR the EVA-Vet Digital Imaging System. A setting of 6 - 8 for film sensitivity is a good range for Kodak Ultra-Speed (D) speed film.

A3.5.1. Exposure time chart

This chart shows the exposure time (in seconds) for radiographs with a film sensitivity of **4** and the equipment running at the rated voltage.

The first column indicates the type of teeth or radiograph.

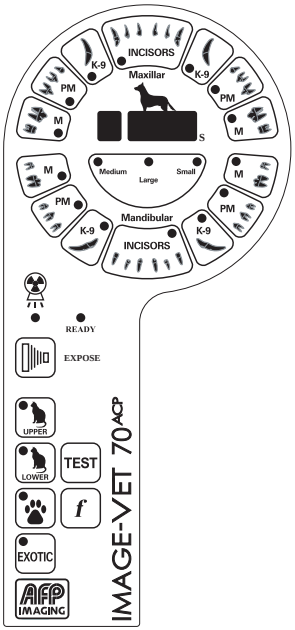
The second column indicates the exposure time for animals with light jaws, the third the exposure time for animals with medium or average jaws, and the fourth that for animals with large or dense jaws. Small, Medium and Large Patient settings also apply to parts radiographed with the PAW and EXOTIC settings.

Tooth Selections	Small Patient	Medium Patient	Large Patient
UPPER INCISORS	0.10	0.12	0.13
UPPER CANINES	0.22	0.25	0.28
UPPER PREMOLARS	0.17	0.20	0.23
UPPER MOLARS	0.17	0.20	0.23
LOWER MOLARS	0.13	0.15	0.17
LOWER PREMOLARS	0.13	0.15	0.17
LOWER CANINES	0.17	0.20	0.23
LOWER INCISORS	0.08	0.10	0.12
CAT (UPPER)	0.13	0.15	0.17
CAT (LOWER)	0.08	0.10	0.12
PAW	0.30	0.35	0.40
EXOTIC	0.08	0.10	0.12

Radiograph-film correction chart

Sensitivity	Standard Variation coefficient	
1	0.500	- 50 %
2	0.630	- 37 %
3	0.800	- 20 %
4	1.000	0%
5	1.250	+ 25 %
6	1.600	+ 60 %
7	2.000	+ 100 %
8	2.500	+ 150%
9	3.200	+220%

The above chart shows the amount of exposure time variation for the different film sensitivity values



NOTE: All upper and lower tooth selections are for dogs only. Due to the relatively small dentition of cats, only the selection for any upper or maxillar feline tooth (CAT UPPER) or any lower or mandibular feline tooth (CAT LOWER) is needed. The PAW setting is for any paw that can be rediographed within the field size of the cone. The EXOTIC setting is for bird wings, small animal extremities, etc., that can be radiographed within the field size of the positioning cone.

A4. Film developing

A4.1 Automatic Processor

Automatic film processors designed for processing dental films with RP type chemicals (such as the AFP 810 Plus or 810 Basic) control all of the processing parameters (such as temperature, time, washing and drying) automatically. When set up and maintained properly, they will develop the images with very little attention required by the operator.

A4.2Manual Hand Tank Processing

In order to obtain good quality images, the film must be developed by carefully following the instructions below:

1.) Remove the film from the package in a dark room taking care not to damage it with fingerprints or scratches. Use holder clips as required.

2.) Immerse the film in the developer and shake it for a few seconds then leave it for 5 minutes at a temperature of 68°F (20°C), 6 minutes at 66°F (18°C) or 4 minutes at 72°F (22°C).

3.) Rinse in running water for approx. 20 seconds. Immerse the film in the fixing agent, shake it for a few seconds and leave it there for at least 5 minutes.

4.) Wash the film in running water. This operation and the ones that follow can be performed outside the dark room. Dry the film in the open air away from dust.

5.) The slightest amount of fixer will contaminate the developer solution. Never move a film from the fixer solution back into the developer solution.

It is extremely important to use fresh chemicals dispensed in the correct proportions. Do not add developer to make the baths stronger as this increases contrast but reduces detail.

	POSSIBILITIES			
DEFECTIVE IMAGES	EXPOSURE TIME	DEVELOPING TIME	STATE OF THE BATHS	POSITION
Underexposed	Too short	Too short	Cold	
Overexposed	Too long	Too long	Hot	
Lack of detail	Too short		Cold or depleted	
Blurring or double image				Patient moved during exposure
Distorted				Film bent during exposure
Not centered				incorrect angle
Teeth elongated				Incidence angle of center beam too horizontal
Teeth shortened				Incidence angle of central beam too vertical
Too light or transparent			Fixing time too long	
Not transparent enough			Fixing time too short	

A5. Cleaning and disinfection

The external surfaces and parts of the equipment must be cleaned and disinfected. Clean with warm water and mild detergent (optional), using a soft cloth. Disinfect with a disinfectant such as "Cavicide" or equivalent. Take care not to get any of these on the X-ray port. Never immerse the tubehead or timer control in water or other liquids.

The wide variety of pharmaceuticals and chemicals used in dental operatories can damage coated and plastic parts if not compatible with these products.

Tests and research carried out have shown that parts cannot be completely protected from the aggressive action of all products available on the market. The aggressive effects of these products depends on the length of time they are left on the parts.

It is therefore important to remove these substances from the equipment quickly.

IMPORTANT!

Do not use products containing methylated spirits, ammonia or benzol. The material used for cleaning and disinfection should be thrown away afterwards.

How to dispose of the waste products. When disposing containers of disinfectant, be sure to abide by local and national regulations.

A5.1. Cleaning and disinfection instructions

Instruments.

Use soft, non-abrasive, disposable paper or cloth for cleaning and disinfection. Do not use sponge cloths or any other re-usable material.

Procedure.

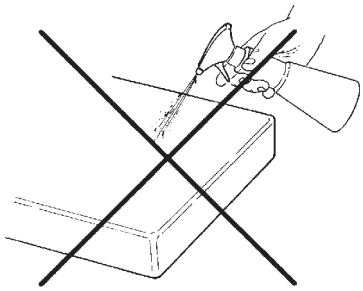
Cleaning and disinfection are two closely related operations and should be performed together.

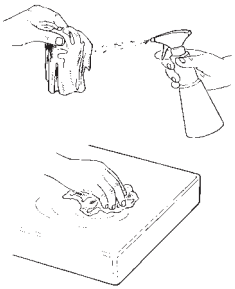
This is to protect the user from contact with contaminated parts and to avoid the danger of spreading the contamination when wiping the parts.

Pre-disinfection: If the parts are extremely dirty or contaminated, soak disposable paper or cloth with plenty of "Cavicide" or equivalent disinfectant. Using the paper or cloth, generously apply the disinfectant to the contaminated parts in order to cover them thoroughly (be careful to prevent seepage). Wait 10 minutes to allow the disinfectant to eliminate the bacteria and remove the organic deposits.

Cleaning: At this point, take a new piece of disposable paper or cloth soaked with disinfectant or warm water and wipe the dirty parts.

Disinfection: Soak clean paper or cloth with disintectant and go over the parts to be disinfected again. Leave on for 10 minutes and then remove the residue with dry disposable paper or cloth. If the parts are not particularly dirty, the *Pre-disinfection* stage can be omitted and it is possible to go straight to the *Cleaning* stage.





A6. Maintenance

Preventive maintenance is described in Section B3 under Installation .

Any servicing should be carried out by qualified service personnel.

A6.1. Periodic maintenance

Every year:

Perform radiation emission testing as required by your local codes.

Check the labels located on the control panel and X-ray tube for condition.

Check the exterior of the equipment for damage that may reduce protection against radiation.

Make sure the double-jointed scissors arm is properly balanced.

Lubricate the pivot bushing and the pivot pin, located between the arm and the tubehead, with MOLIKOTE D graphite-based grease or equivalent.

Check the earth ground connection.

Every two years:

Check current input to the X-ray tube (see paragraph B3.1.7).

A6.2. Malfunction and error messages

The equipment does not come ON: the power switch is turned to the “OFF” position, therefore it must be switched to the “ON” position. If the trouble persists call your dealer’s service dept.

No X-rays are emitted: the tubehead is cooling down, wait for the “ready” signal.

E 001 **X-ray control button released too soon.** Reset the equipment by pressing any other button. Replace the film.

E 002 **Main frequency momentarily incorrect.**

Reset the equipment by pressing any other button.

E 003 **Hardware problem in zerocrossing circuit.**

Turn the equipment off and then on again. If the trouble persists call your dealer’s service dept.

E 004 **Supply voltage above the maximum limit.**

Turn the equipment off and then on again. If the trouble persists call your dealer’s service dept.

E 005 **Supply voltage below the minimum limit.**

Turn the equipment off and then on again. If the trouble persists call your dealer’s service dept.

E 006, E 007 & E 008 **Are not used.**

E 009 **No power to the X-ray tubehead.**

Turn the equipment off and then on again. If the trouble persists call your dealer's service dept.

E010 **The X-ray tubehead is shortcircuited or the supply and neutral wires are reversed or system is failing the software check for tube current.**

Turn the equipment off and then on again. If the trouble persists call your dealer's service dept.

E 011 **Hardware problems in the power supply circuit.**

Turn the equipment off and then on again. If the trouble persists, call your dealer's service dept.

E012 **X-ray emission not possible.**

This happens when more than one tubehead is being operated and the radiation control button is pressed when the controller is not READY.

E013 **Audible warning device not working.**

Press any key and call your dealer's service dept.

E014 **Hardware problems in the control circuit.**

Turn the equipment off and then on again. If the trouble persists, call your dealer's service dept.

E015 **Hardware problems in the mains voltage tester circuit.**

Turn the equipment off and then on again. If the trouble persists, call your dealer's service dept.

E EEE **Hardware problems in the control system.**

Call for service.

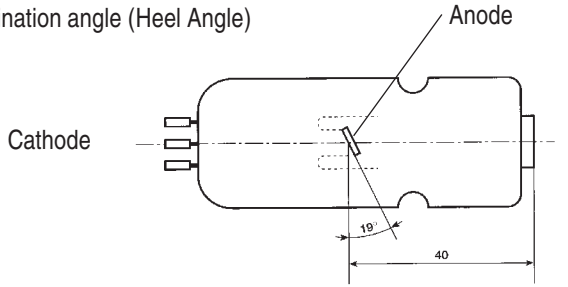
A7. Technical Specifications

The X-ray tubehead has been certified by the manufacturer to be in compliance with FDA regulations as per 21 CFR SUBCHAPTER J as amended. Periodic compliance testing of this equipment may be required by local governmental agencies. There are no regulatory performance standards for veterinary X-ray equipment.

System Classification:	Electromedical Equipment, Class 2 (FDA)
Model Type	Image-Vet 70*ACP*
Installation plan	See AFP drawing #897-000162
Supply Ratings:	
Line voltage	120/230 VAC +/- 10%
Line frequency	60/50Hz
Maximum absorbed current	7.8 A rms impulsive @ 132 VAC
Power consumption	1.1 kVA impulsive @ 132 VAC
Line voltage regulation	<3%
Circuit type	Single phase self-rectifying with grid control
X-ray System Ratings:	
Programmed times	18 selectable times in radiographic mode
Film / Sensor sensitivity	9 levels
Compensated load factors	The exposure time is compensated on the basis of the input voltage applied
Min. exposure time	0.02 s.
Max. exposure time	1.28 s.
Indicated time resolution	0.02 s.
Preheating time	100 ms
X-ray tube manufacturer and type	CEI - OCX 70-G (with grid) Toshiba KL16-0.8-70G (with grid)
Tolerances:	
Nominal high voltage value	70 kVp $\pm$ 15%
Anode current	8 mA $\pm$ 15%
Accuracy of indicated time	+ 48%
Power rating	430 W
Total filtration	2 mm Al eq. @ 70 kV
HVL (Half Value Layer)	>1.5 mm Al eq.
Inherent filtration	(CEI) - 0.5 mm Al eq. @ 70 kV (KL16) - 0.4 mm Al eq. @ 70 kV

Transformer insulation	Mineral Oil bath
Exposure time interval	1 s exposure - 30 s pause
Min. focus to skin distance	7.9 in (20 cm)
Diameter of X-ray beam (when it reaches the skin at end of cone)	≤ 2.36 in (6 cm)
Cooling	Convection
Radiation leakage at 1 m	< 0.25 mGy/h
Radiation leakage characteristics	70 kV - 8 mA, 1 s @ 132V per cycle, 1 exposure every 30 seconds
Focal spot	0.8 mm (IEC 336)
Anode material	TUNGSTEN (W)

Datum line and anode inclination angle (Heel Angle)



Operating temperature range	+50°F - +104°F (+10°C - +40°C)
Operating relative humidity range	30% - 75%
Temperature range for transport and storage	-4°F - +168°F (-20°C - +70°C)
Max. relative humidity for transport and storage	<95% non-condensing
Min. atmospheric pressure for storage and transport	630hPa

A8. Fuses

ID.	RATING 120V	RATING 230V	PARTS PROTECTED	LOCATION
F1	T 10A	T 6.3A	120/230 V Tubehead Protection	Control unit
F2	T 100mA	T 100mA	10 V Secondary winding of transformer	Control unit
F3	T 1A	T 1A	10 V Secondary winding of transformer	Control unit
F4	T 10A	T6.3A	120/230 V X-ray, X-ray equip. power supply circuit	Control unit

NOTE: The “T” rating for fuses stands for time-delay (similar to SLOW-BLOW)

SECTION B: INSTALLATION MANUAL
Image-Vet 70ACP

(ONLY FOR AFP CORP-AUTHORIZED SERVICE TECHNICIANS)

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B1. Pre installation

Installation Procedure Outline - Image-Vet 70*ACP*

1) Determine location for X-Mind Control / wall support, input power supply line (120/230 volts/15 amps) and extension arms with respect to the examination table.

2) Decide if internal wall wiring or external surface wiring will be used.

3) Mount X-Mind Control / wall support, extension arm and scissors arm.

4) Install X-ray tubehead.

5) Interconnect X-Mind and tubehead power supply cable.

6) Connect to primary power supply.

7) Test System - **Caution** observe X-ray safety precautions.

WARNING!

PROTECTION FROM X-RAYS

X-rays are harmful if improperly used. The instructions contained herein must be strictly observed. All radiographic installations must comply with local codes and jurisdictions.

It is essential that the installer:

Review Section B before attempting an installation.

Set up the x-ray equipment by following the instructions contained herein.

Provide the operating personnel with all the instructions necessary for using the x-ray equipment, as outlined in the User's Manual.

Fill out the INSTALLATION AND WARRANTY RECORD and send it to AFP CORP. in order for the warranty to have effect (as indicated in the WARRANTY CERTIFICATE supplied).

In addition, the FDA requires that FORM FDA 2579 (REPORT OF ASSEMBLY OF A DIAGNOSTIC X-ray SYSTEM), be filled out and sent to the FDA upon the completion of an X-ray system installation.

B1.1. Packing

Packing container dimensions:
42 in X 20.5 in X 11.5 in
(107 x 52 x 29 cm)
Max. weight: 88 Lbs (40 kg)
Contents:

a Technical documentation and warranty certificate
b Atlas and "Getting Started" video
c X-Mind timer / wall mount
d X-ray tubehead
e Extension arm
f Accessory kits
g Scissors arm
h Packing material

B1.1.1. Shipment and storage

The polystyrene packing is placed in a cardboard box. Instructions concerning shipment, storage and unpacking are found on the outside of the box. **These must be strictly observed.**

1) Only move and handle in the direction indicated by the arrows.
2) Avoid banging the container. Do not drop.
3) Protect from humidity.
4) Do not use hooks to handle.
5) Nameplate indicating the required ambient conditions for storage:

a) temperature between -4° and 168°F (-20° and 70°C)
b) relative humidity less than 95%
c) Min. atmospheric pressure 630 hPa.

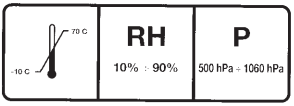
1

2

3

4

5



B1.2. Tools needed for installation

Multi-meter
Tape measure
Spirit level
Power drill and a set of drill bits for masonry or drywall
(including 3/8" & 5/16" bits)
Small screwdriver for
electrical connections
Medium-sized screwdriver
Philips screwdriver
Wire crimping tool
Open-end wrench (13 mm)
6 mm Allen key
3 mm Allen key
Assorted wire terminals for
16 & 14 AWG wire
Cable ties

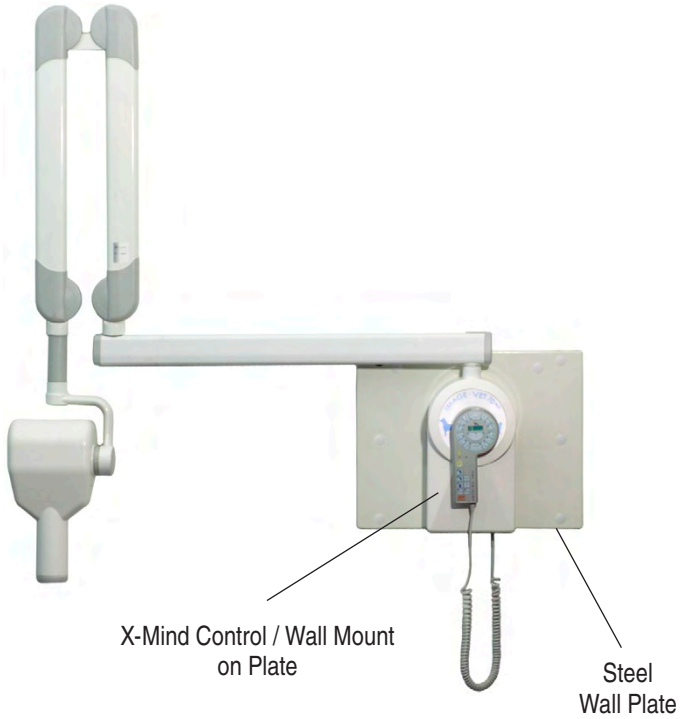
B1.3. Pre Installation requirements

Determine if the large Wall Mounting Plate will be necessary. If not, the X-Mind Timer Assembly used to mount the X-ray support arms and tubehead must be firmly secured to the wall. Use fasteners suitable for the site conditions and have an adequate load capacity (i.e. capable of withstanding a 390 Lb / 177 Kg total load). In the presence of concrete or brick walls, use anchor bolts. As an alternative, resinbonded anchor bolts can be employed:

For Wall Plate Only:

(6) Pieces 5/16" diameter bolts and wall plugs or expansion anchors
(6) Sets of bolt head covers are supplied

System shown on Steel Wall Plate



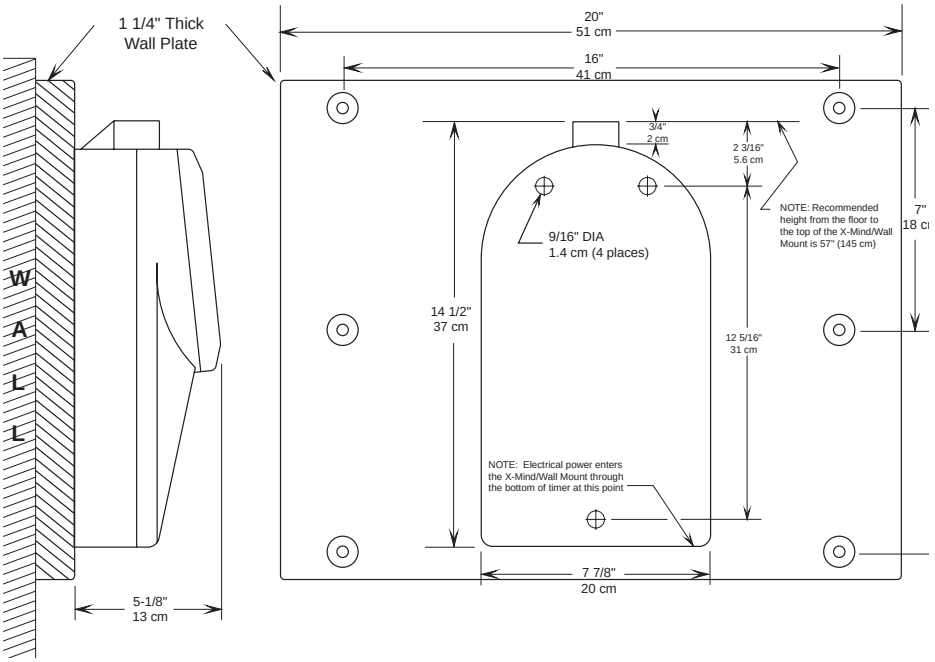
STEEL WALL MOUNTING PLATE
PN 9992700112

IMAGE VET 70ACP X-MIND TIMER/WALL MOUNT
STEEL WALL MOUNTING PLATE INSTALLATION KIT

CONTENTS:

1 pc	P/N 897-000007	Steel Wall Mounting Plate, White
6 pcs	P/N 897-000008	1" DIA, Hole Plug, Plastic White
1 pc	P/N 897-000162	Instructions, Template for Steel Wall Mount
3 pcs	P/N 000-01216-BT-B	5/16" – 18 x 1" Allen Cap Screws For X-Mind Timer Assembly Mounting
3 pcs	P/N 000-09600-AF-H	Lock Washers for Allen Cap Screws

Steel Wall Mounting Plate Kit
P/N 9992700112



Optional Ceiling Pole Mounting Kit
P/N 9992701510

An optional ceiling mounting kit is available for the ImageVet 70ACP. This kit consists of a steel ceiling support plate assembly and a vertical steel pole with a short, horizontal support arm to mount the Image Vet 70ACP from above. This would be instead of a wall mount or mobile stand. IMPORTANT NOTE: The Ceiling Mount Kit will require additional structural preparation in the ceiling to support the weight of the X-ray unit, particularly when the Scissor Arm is extended. Consult the suggested preparation methods before attempting an installation.

1) Steel Wall Plate dimensions are 20" wide x 15 ¾" high x 1 ¼" thick. Wall Mounting bolt hole pattern is on standard 16" centers horizontally and 7" centers vertically. The hollow, steel box design and construction allows for internal (hidden) wiring and interconnection of components.

2) Before installation, review site specifications, table location in the room layout, 120/230 Volt power supply location and wall mounting location. Respecting local X-ray safety codes, determine the most suitable location for the operator of the X-Mind Timer Hand Control, which includes a 12 foot extension coil cord.

3) Determine the best location of the Wall Mounting Plate. Use the Template (P/N 897-000162) information to determine the reach of the X-ray tube support system towards the operatory table and patient so sufficient coverage will be achieved.

4) Prepare or plan the most desirable wiring method for the X-Mind Timer in the operatory site considering the location of an available 120/230 Volt power supply.

5) Mark the six Wall Mounting Plate bolt hole locations on the wall, in alignment with the internal wall studs or other sufficient support means.
DO NOT MOUNT WALL PLATE OR X-RAY UNIT AT THIS TIME.

6) Determine if external surface wiring or internal to the wall wiring will be used to provide 120/230 Volts to the X-Mind Timer control.

7) Route the 120/230 Volt power supply to a point central to the Wall Plate location using surface wiring or internal wall wiring. Supply an electrical termination box as per local codes.

8) If wiring is internal to the wall, allow a 24" pigtail of the 120/230 Volt supply line and ground to exit from the wall.

9) Using six appropriate 5/16 dia. lag bolts or toggle bolts (DO NOT USE PLASTIC WALL SHIELDS) fasten the Wall Plate to the wall after routing the 24 inch 120/230 Volt power supply pig tail to the selected X-Mind Timer wire access hole near the bottom of the plate.

10) Remove the plastic X-Mind cover by loosening the two screws placed on the lower part and lifting the cover from the bottom to the top to release the upper clamps.

11) Mount the X-Mind Timer Assembly on center of the Wall Plate using three 5/16"-18 x 1" Allen Cap Screws.

12) Route the power supply wires and to the terminal strip on the bottom of the timer. See Section B2.2 for detailed electrical connection information.

13) Mount Extension Arm, Scissors Arm and X-ray Tube as per section B2.1

14) Insert six 1"dia. white plastic hole plugs to finish appearance.

B1.4. Pre Installation electrical requirements.

Refer to wiring diagrams included with the unit
Installation method and materials must be in compliance with local electrical codes. Determine if supply wiring will be internal to the wall or surface mounted. Confirm that installation is for 120/230 VAC operation.

Control unit power supply

Electrical power must be supplied to the control unit through a 3 conductor, 16 AWG power cord. NOTE: The X-Mind control is provided with a 10 A, On-Off switch. The main or primary power source or supply (LINE, NEUTRAL & EARTH) must be controlled by an independent cut-off switch or circuit breaker as specified by local electrical standards.

Determine the best location for the X-mind timer/wall mount. Take into consideration the location of operatory equipment and a safe location for the operator when exposing X-rays.

B2. Installation procedures

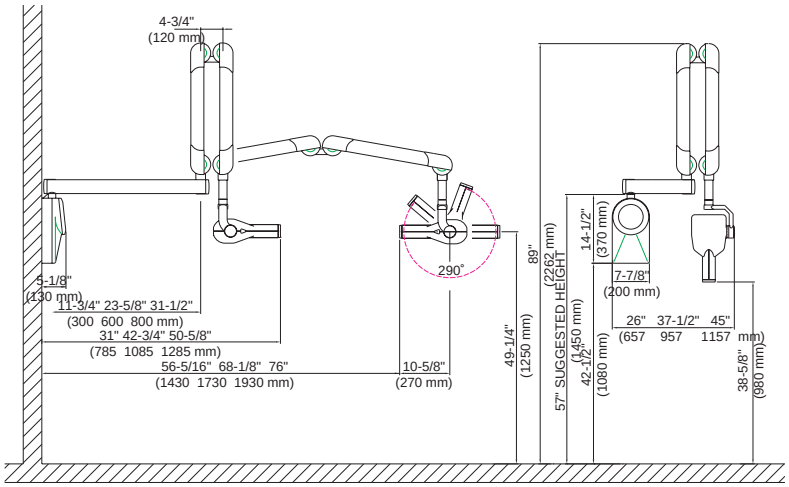
X-ray equipment should only be installed by qualified personnel following the instructions in this manual and local code requirements.

CAUTION!

First of all, make sure the supply voltage corresponds to that indicated on the X-ray tubehead nameplate. Most domestic installations are for 120 volt operation. Turn off all power sources for the X-ray equipment.

B2.1. Installing the X-ray equipment

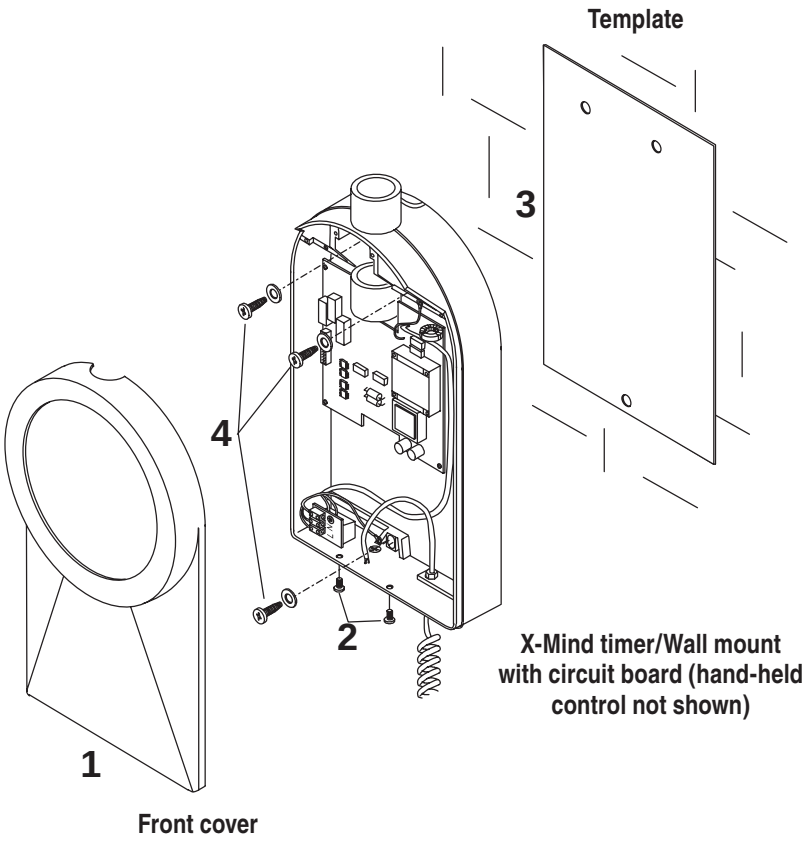
Determine if masonry or dry wall construction will be utilized. Locate vertical studs or structural members in the wall before mounting the X-Mind timer/wall mount assembly and articulating arm. Determine if electrical power supply wires will be internal to the wall or surface mounted. Use appropriate sized wall plugs, through bolts or expansion bolts to support the system. Prepare the power source and disconnect switch before mounting the system.



B2.1.1. X-Mind Timer Assembly direct or on optional Wall Mount Plate

First, determine if the X-Mind Timer Assembly will be mounted directly on the wall or if site conditions require the wall mount plate. This will be determined by the existing wall construction and load bearing ability. The wall mount plate spreads the load over a larger area and is recommended for dry wall/stud construction sites.

1. To be sure that the equipment is in the correct position, we recommend you put the provided template (**3**) into the desired position. Considering the overall dimensions of the equipment, put the top part of the template approximately 57" from the floor.
2. Mark the mounting points and make the respective holes with a diameter corresponding to the chosen screws, depending on the wall construction in the room.
3. Remove the plastic timer cover (**1**) by loosening the two screws (2)located at the bottom and lifting the cover from the bottom to the top to release the upper clamps.
4. Attach the timer to the wall using the relevant screws (**4**).



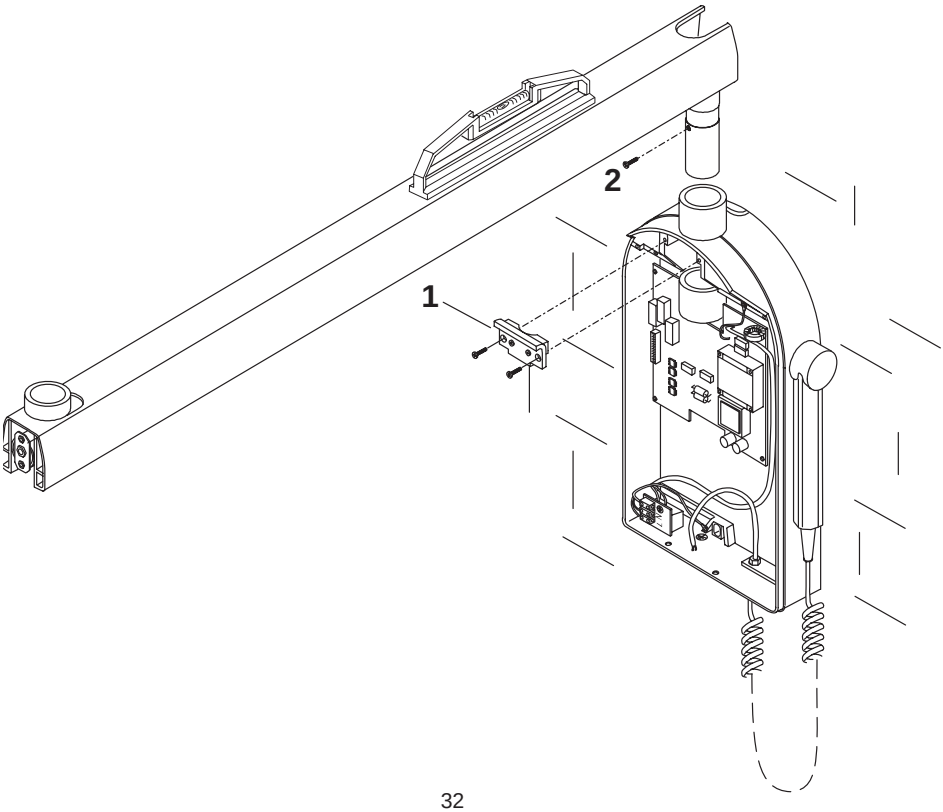
B2.1.2. Extension arm

1. 1. Insert the extension arm into the arm support block which is an integral part of the wall support plate.

   NOTE: You must keep the arm at right angles to the plate to be able to insert the shaft into the bush placed inside the support.

2. Check that the arm is level using a bubble level; if it is not level it is better to release the mounting screws on the wall plate and make the necessary adjustments.
3. The horizontal check must be performed in the three orthogonal positions (arm parallel to the wall on the right, on the left and perpendicular to the wall itself).
4. When finished with the above operations, assemble the extension arm frictioning mechanism block (**1**); this frictioning mechanism is supplied separately.
5. Assemble the arm rotation stop screw (**2**) in the hole provided on the shaft; this screw is supplied with the frictioning mechanism.

   NOTE: The purpose of the frictioning mechanism and the rotation stop pin is to prevent the extension arm from becoming detached.



B2.1.3. Double-jointed scissors arm

WARNING! IMPORTANT!

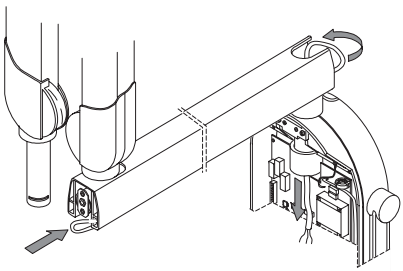
The two main parts of the scissors arm are held together with a tie band. The band **MUST NOT BE REMOVED** until the two ends of the arm are fixed to the wall extension arm (already secured) and to the Xray tube head. If the tie-band comes loose before the arm has been fixed in place, the abrupt spring-back movement may damage the arm itself and above all may injure the installer. Due to its preloaded spring, the double jointed scissors arm cannot be used unless the related extension arm and tubehead are in place.

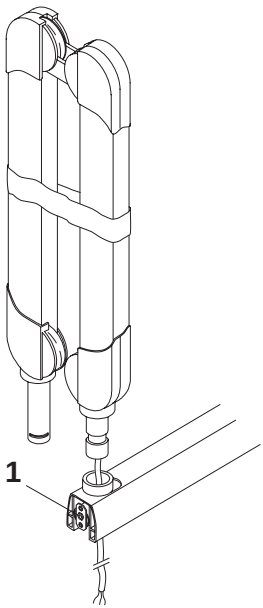
Assembling the arm:

1. Check that the friction mechanism (**1**) assembled on the extension arm at the end where the scissors arm is mounted has been loosened, so that the arm can be inserted correctly without damaging the friction mechanism.
2. Insert the scissors arm pin into the extension arm; keep the scissors arm tightened during this operation. The cable and the braiding coming from the scissors arm must be pulled out from the extension arm.

   NOTE: You must keep the scissors arm at right angles to the extension arm in order to be able to insert the pin into the bushing placed inside the extension arm.
3. Insert the cable coming from scissors arm inside the extension, following the diagram shown below.
4. Run the cable inside the extension arm until it comes completely out the opposite end. Insert the cable inside the rotation pin as shown in the illustration below.
5. Check that the scissors arm is perfectly inserted; check that the rotation of the scissors arm inside the extension arm is the one ergonomically required by the operator, otherwise work on the friction mechanism (**1**) until you get the desired operation.

   NOTE: The friction mechanism also serves to prevent the scissors arm from becoming detached and for this reason it must never be loosened completely.
6. Assemble the tubehead (see section B2.1.4)





Note: perform steps 7 and 8 after tubehead installation.

7. Remove the scissors arm safety clamp and check the ergonomics of its movement again, otherwise adjust the friction mechanism again (**1**) and/or the tension of the arm balance springs (see section B4.3.3.).
8. Assemble the front covers of the extension arm, packaged separately with the small parts.

B2.1.4. Tubehead

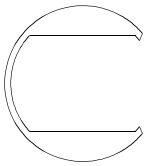
Installing the tubehead:

Make sure the tie-band of the scissors arm is tight to prevent springing open.

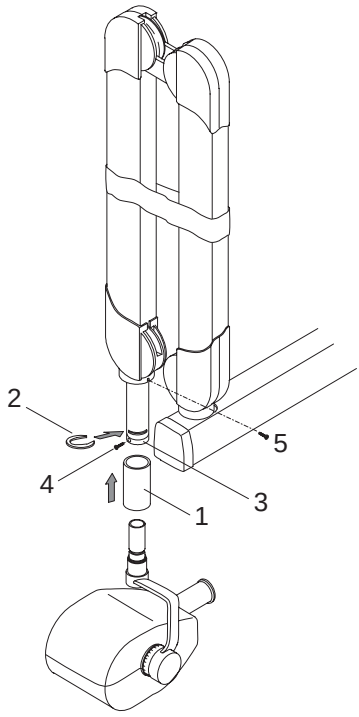
1. Slide the protection cover (**1**) into the scissors arm until you can see the insertion slot of the retainer clip (**2**). Hold it up and insert the ring partially.
2. Insert the rotation pin of the tubehead onto the sliding contact for about half of its length and put the retainer clip (**2**) into the two horizontal slots.

   NOTE: The retainer clip must be inserted on the same side as the safety screw to prevent the cover from moving excessively.
3. Insert the rotation pin completely into the sliding contact, securing it with the retainer clip (**2**). Insert the grounding clip (**3**), making sure that the pins enter the holes and attach with the supplied screw (**4**). Lower the protection cover (**1**). **Only now may the scissors arm be released.**
4. Insert the safety screw (**5**) which secures the protection cover.

   NOTE: The function of the cover is to prevent the retainer clip from falling out. Steps 7 and 8 above should now be performed.



Retainer clip

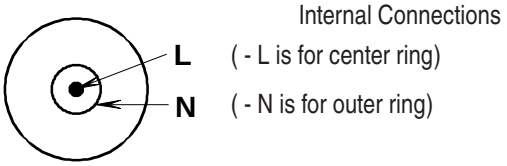


B2.2. Electrical system - Refer to wiring diagram on page 36.

B2.2.1. Electrical output to tubehead

L - BLACK OR BROWN supply wire
N - WHITE OR BLUE neutral wire
YELLOW/GREEN ground wire

End of scissors arm



Above is a view looking into the end of the scissors arm where the tubehead is inserted.
Neutral wire (N) in the scissors arm is connected to the outer ring. Hot or Line wire (L) in the scissors arm is connected to the center pin.

B2.2.2. Wiring the control unit

Connect the incoming line voltage to the terminal block (M3) as indicated:

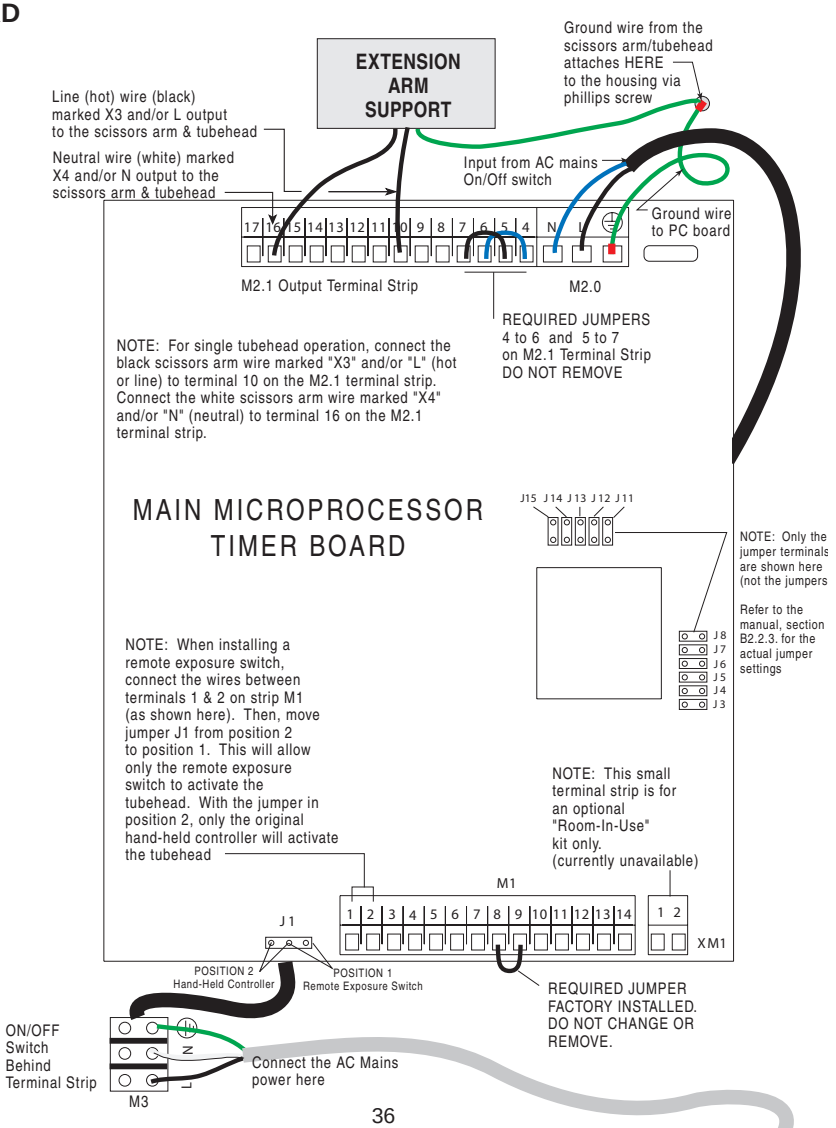
L - BLACK OR BROWN line/hot wire
N - WHITE OR BLUE neutral wire
⏚ YELLOW/GREEN ground wire

Confirm that there is a jumper wire between 8 & 9 on M1 at bottom of board (See diagram)

DO NOT CONNECT BETWEEN 8 & 9 ON M2.1 LOCATED AT TOP OF THE BOARD

Route the hot and neutral wires (See diagram below) coming from the scissors arm to terminals 10 and 16 on the M2.1 terminal strip. It is important that the LINE or HOT (black) wire goes to terminal 10 and the NEUTRAL (white) wire goes to terminal 16.

Connect the earth wire coming from the scissors arm to the phillips screw (shown at the upper right of this diagram) located on the metal housing of the control unit.

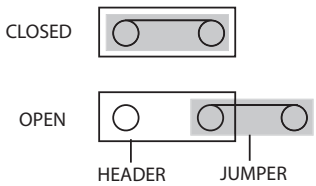

EXTENSION ARM SUPPORT
Ground wire from the scissors arm/tubehead attaches HERE to the housing via phillips screw
Line (hot) wire (black) marked X3 and/or L output to the scissors arm & tubehead
Neutral wire (white) marked X4 and/or N output to the scissors arm & tubehead
Input from AC mains On/Off switch
Ground wire to PC board
17 16 15 14 13 12 11 10 9 8 7 6 5 4 N L
M2.1 Output Terminal Strip
M2.0
REQUIRED JUMPERS 4 to 6 and 5 to 7 on M2.1 Terminal Strip DO NOT REMOVE
NOTE: For single tubehead operation, connect the black scissors arm wire marked "X3" and/or "L" (hot or line) to terminal 10 on the M2.1 terminal strip. Connect the white scissors arm wire marked "X4" and/or "N" (neutral) to terminal 16 on the M2.1 terminal strip.
MAIN MICROPROCESSOR TIMER BOARD
J15 J14 J13 J12 J11
NOTE: Only the jumper terminals are shown here (not the jumpers
Refer to the manual, section B2.2.3. for the actual jumper settings
J8 J7 J6 J5 J4 J3
NOTE: When installing a remote exposure switch, connect the wires between terminals 1 & 2 on strip M1 (as shown here). Then, move jumper J1 from position 2 to position 1. This will allow only the remote exposure switch to activate the tubehead. With the jumper in position 2, only the original hand-held controller will activate the tubehead
NOTE: This small terminal strip is for an optional "Room-In-Use" kit only. (currently unavailable)
M1
1 2 3 4 5 6 7 8 9 10 11 12 13 14
1 2
XM1
J1
POSITION 2 Hand-Held Controller
POSITION 1 Remote Exposure Switch
REQUIRED JUMPER FACTORY INSTALLED. DO NOT CHANGE OR REMOVE.
ON/OFF Switch Behind Terminal Strip
N
L
Connect the AC Mains power here
M3

B2.2.3. Control unit configuration and functions

JUMPER	DESCRIPTION	POSITION	MEANING
J1	Hand-held control Remote control	Position 2 Position 1	Hand-held control Remote exposure control
J2	-	Not Used	-
J3	Main line frequency (60 or 50 Hz)	Closed Open	60 Hz 50 Hz
J4	Maximum number of tubeheads	Open	1
J5	Main line voltage tolerance	Open	±13%
J6	Anode current check	Closed Open	On Off
J7 J8	Pre-heat time selection	J7: Closed J8: Open	Pre-heat time = 100 ms
J11	Software config.	Closed	1 tubehead veterinary system
J12		Closed	
J13		Open	
J14	Main line voltage	Closed Open	110VAC / 115VAC 220VAC / 230VAC
J15		Open	AFP veterinary ACP **only**

Closed - Means that the jumper **connects** the two header pins.

Open - Means that the jumper **does not connect** the two header pins.



B2.2.4. Conditioning the X-ray tube

Once installation has been completed, the X-ray tube is to be conditioned to eliminate any impurities which may have built up on the anode during storage or shipment. To do this, proceed as follows:

Set a time of 0.02 s.
Allow the tube to emit radiation at least 15 times.
Set a time of 1 s.
Allow the tube to emit radiation and make sure the control unit does not indicate the presence of faults.

WARNING

Whenever making an X-ray exposure, use extreme caution. Keep as far as possible from the source of radiation. Stay opposite the direction in which the X-rays are emitted. Use protective apron or shields as necessary.

B2.2.5. Checking the power supply to the control unit

Take readings with an AC voltmeter (maximum end-of-scale value: 200 Vac) to make sure the supply is as specified for the equipment.

Connect the voltmeter to terminals L and N on the terminal block M2 of the control unit board.

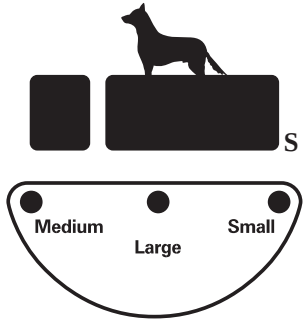
Turn on the control unit and check the voltage readings on the voltmeter (voltage with no load applied).

Select the “PAW” setting and press the “F” key until the number “9” is showing in the LED display to the left of the time setting. Additionally, select the “Large” patient type.

Move as far away as possible from the area where the X-rays are to be emitted.

Perform a radiograph. While the Xrays are being emitted, check the voltage indicated on the voltmeter (voltage with load applied).

The result of the following equation [(V without load - V with load) / (V with load)] x 100 must not exceed 3. If this is not the case, have an electrician check the electrical supply.



B3. Preventive maintenance

B3.1. Checks

AFP recommends that the following maintenance procedures be carried out periodically. It is good practice to perform these procedures when the equipment is installed and then once every year thereafter.

IMPORTANT

CAUTION: TO BE PERFORMED ONLY BY A QUALIFIED SERVICE TECHNICIAN

Should any trouble be found when these checks are made, consult the "Corrective maintenance" chapter contained herein or contact AFP technical support. In the meantime do not allow use of the equipment.

B3.1.1. Tubehead rotation

Make sure the tubehead rotates smoothly. Should this not be the case remove the tubehead and check and clean the internal parts. Lubricate the pivot bushing of the arm and the pivot pin of the tubehead with MOLIKOTE D graphite based grease or equivalent.

B3.1.2. Ease of movement

Make sure the arm moves smoothly in all directions and that it remains in place when it is in its rest position. If this is not so, adjust the locks provided (refer to paragraphs 2.1.5. and 2.1.6.).

B3.1.3. Operation of the timer and Xray control button

Turn on the timer.

Make sure that the timer has come on.

Select an upper canine tooth and film type 7 to perform a radiograph. Make sure the X-ray indicator light comes on during emission and that the audible warning device stops sounding at the end of X-ray emission.

Take another radiograph and release the control button before X-ray emission is completed. Verify that "E 001" appears on the display and that an audible signal (different from the one mentioned above) occurs. Normally, the user must keep the control button pressed until X-ray emission has been completed.

B3.1.4 Measuring high voltage

KVp value is defined as the stationary value of high voltage applied to the tube which settles on load after preheating time.

KVp value is measured by a non-invasive instrument, with accuracy of over 2%, at the nominal value of line voltage.

A direct high voltage measurement can be made only by disassembling the tubehead. **This operation can only be performed in the factory.**

B3.1.5. Measuring the current to the Xray tube

The anodic current value is defined as the average value of stationary current which settles on load after pre-switching time. The anodic current value is measured using a digital voltmeter measuring the voltage drop at the ends of the resistance from 1 kΩ, 1% assembled on the tubehead. To take this measurement, remove the side plastic plug of the tube support; connect the ground voltmeter terminal on the yellow/green cable clamp screw and insert the positive terminal into the contact at the end of the grey cable. The digital voltmeter must be set for DC, and the relation of transformation is given as 1 mA = 1V. Take an exposure of at least 1 sec.

B3.1.6. Measuring the Exposure Time

B3.1.7. Radiation inspection by governmental agencies

Radiation performance tests must be carried out periodically to comply with local regulations for X-ray equipment. Specifications for the operation of this device can be found in Section A.7. Maintain a log of such tests with dates and inspector's acceptance.

B4. Corrective maintenance

B4.1. Service test

CAUTION: TO BE PERFORMED ONLY BY A QUALIFIED SERVICE TECHNICIAN

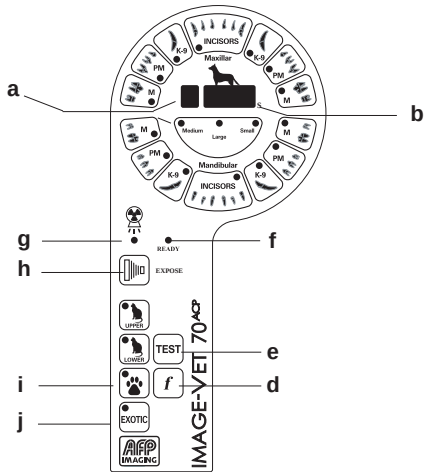
Press and hold the “TEST” button (e) while turning on the system to enable the “Service Test” mode. The display (a) indicates the type of test procedure that has been selected - refer to paragraph A2. Use the Test button (e) to change over to the next test.

TEST 0 - EPROM memory version in the control panel. The display (b) indicates the EPROM memory version in the control panel.

TEST 1 - EPROM memory version in the control unit and check out procedure on the indicator lights and pushbuttons. The display (b) indicates the EPROM memory version in the control unit. Moreover, this test is used to check the pushbuttons and indicator lights located on the control panel. To do this, proceed as follows:
· Press any button in order to turn on the related light. The “X-ray” and “Ready” lights (g & f) will come on and off one after the other every time a button is pressed.
· Press the “Test” button (e) to change over to the next test.

TEST 2 - Function enabling
This test is used to check the state of the jumpers on the control unit card.
· Press the “F” button (d) to select the number of the jumper shown on the display. The letter on the left indicates the state of the jumper: A= open; C = closed

TEST 3 - Checking the connections
This test is used to check the inputs and outputs between the control unit and the X-ray tubeheads installed.
· Bring one tubehead at a time into its work position.
· The LED on the wall-mount plate lights up.
· The display (b) indicates the wall mount plate selected (a, b, c, d).
· Press the X-ray control button (h).
If “P - E” is shown on the display’ the command is okay.



TEST 4 Supply voltage
During this test procedure’ the control panel serves as a voltmeter and the display (b) will show the input voltage to the equipment. The voltmeter is set by the manufacturer with high precision instruments during the testing procedures. If a difference greater than 3 V is found between the voltage shown on the display and the rated voltage, the equipment must be reset as next described.

WARNING!

This operation will modify the voltage used for "time compensation". Therefore, only change the setting when using properly set and accurate instruments.

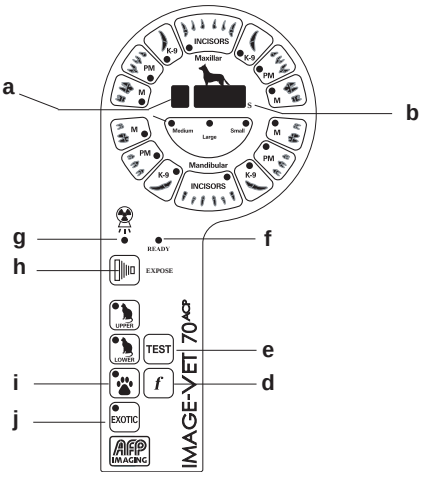
· Set the digital voltmeter to a range ≥ 200 Vac. Attach the test leads to the supply terminals of the control unit.
· Press the "F" button (d) - the number of the test will start flashing.
· Change the value shown on the display (b) so that it corresponds to the one indicated on the voltmeter. To increase the value press the "PAW" button (i). To decrease the value press the "EXOTIC" button (j).
· To enter data and stop the test procedure, press the Test button (e).

TEST 5 Number of exposures with Xray tubehead A
The display (b) shows the total number of exposures (X 100).

TEST 6 Exposure time with X-ray tubehead A
The display (b) indicates the total time of exposure in minutes.

Tests 7, 8, 9, A, B, & C all pertain to multiple tubehead configurations and do not apply. Continue to depress the "F" key for each test up to the last test (C).

At the end of the procedure, the program tests the software for proper functioning (watch-dog). If no faults are found, the equipment quits the "service test" mode and switches back to normal operation. If faults are found, the equipment stops working. Turn off the equipment and repeat the test procedure.
If the trouble persists, replace the main PC board of the control unit.



TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS
When the equipment is turned on, no indicator light comes on	No power delivered between L and N in connector M2 in the control unit	The line switch IS open Faulty power supply The supply wires are improperly connected
	The main switch is turned to position 0 (OFF)	Move the switch to position “I”
	Fuse F4, located in the control unit, has blown	Replace the fuse with one having the same amperage rating, i.e. T 10 A, 250 V, (5x20).
	The main PC board in the control unit is faulty	Replace the main PC board
	No power delivered between pins 6 and 7 in connector M2	Replace the faulty switch
One or more buttons on the control panel do not work	Faulty connections inside the electrical cabinet	Replace the handpiece control assembly
Fault message E 001 appears	The X-ray control button has been released too soon	Reset the equipment by pressing any button. Replace the film
Fault message E 002 appears	Frequency momentarily incorrect	Frequency momentarily incorrect
Fault message E 003 appears	Hardware problem in zero-crossing circuit	Turn the equipment off and then on again. If the trouble persists, replace the main PC board
Fault message E 004 appears	Supply voltage above the maximum limit	Turn the equipment off and then on again. If the trouble persists, make sure the supply voltage corresponds to the rated voltage (+ 10%). Check jumpers in Table B2.2.4
Fault message E 005 appears	Supply voltage below the minimum limit	Turn the equipment off and then on again. If the trouble persists, make sure the supply voltage corresponds to the rated voltage (+ 10%). Check jumpers in Table B2.2.4
Fault message E 006 appears	Two or more X-ray tubeheads may have been pulled out	Leave one tubehead in position
	The X-ray equipment and the control unit are not properly connected	Use the wiring diagram to check the connections of the control unit
	The X-ray equipment selector switch may be faulty	Replace the switch
Fault message E 009 appears	No electric power delivered to the X-ray tubehead	With the control unit off, check the terminal block connections to the tubehead for electical continuity (less than 5 OHMS)
	X-ray tubehead faulty	Replace the tubehead
	Control relay of tubehead A or B is faulty	Replace the main PC board
Positioning arm drifts left or right	Brake adjustment incorrect	See section B2.1.5. Ensure that the hex (allen) wrench is fully engaged into the brake screw in the end of the horizontal extension arm
Fault message E 010 appears	The connecting wires (L) and neutral wire (N) between the control unit and X-ray tubehead are reversed	Check the supply wires and neutral wire in connector M2
	Tubehead is faulty	Replace the tubehead

TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS
Fault message E 011 appears	Hardware problems in the power supply.	Turn the equipment off and then on again. If the trouble persists, replace the main PC board
Fault message E012 appears	Improper operation	Press any key and then perform the operation in the correct manner
Fault message E 013 appears	The audible warning device does not work The control circuit of the audible warning device does not work	Replace the main PC board Replace the main PC board
Fault message E 014 appears	Hardware problem in the control circuit	Turn the equipment off and then on again If the trouble persists, replace the main PC board
Fault message E 015 appears	Hardware problem in the voltage tester circuit	Turn the equipment off and then on again If the trouble persists, replace the main PC board
Fault message E EKE appears. There is a communication problem between the main PC board and the control panel	One or more conductors are interrupted Hardware problems in the control panel Hardware problems with the main PC board	Replace the cable Replace the handpiece control assembly Replace the main PC board
Film too light	Connection wires to the tubehead are reversed The value selected by the “F” key is too low for the chosen film The temperature of the developer and fixing agent is incorrect or they are in poor condition	Check wiring Press the “F” key to raise the value Check the temperature of the agents or replace them
X-rays and audible warning device are not emitted when the X-ray control button is pressed	Tubehead faulty If the READY light is off, this means the tubehead is cooling down A wire inside the connecting cable between the control panel and main PC board is interrupted Hardware problem on the X-ray control circuit of the control unit Fuse F1 in the control unit has blown	Replace the tubehead Wait for the light to come on Make sure the connectors are properly plugged in, if necessary replace the coil-cable Replace the main PC board Replace the fuse with one having the same amperage rating, F10 A - 250V (5x20)
One or more lights on the control panel have not come on.	Lights have burned out	Replace the handpiece control assembly
During X-ray emission the audible signal is not given out	Audible warning device is faulty	Replace the main PC board
Timer makes clicking sound with no display	No connection to the handpiece control assembly	Check the connection Replace the handpiece control assembly

B4.2.1. Diagnosing problems: tubehead or arm wiring short-circuited or open

Having removed the tubehead, use a multi-meter to check the equipment for electrical continuity and/or for the presence of short-circuits between the wall mount plate and the concentric connector in the support bushing of the tubehead. If shorts are found or the electrical conductors are broken or interrupted, replace the supply cable, the electrical connector(s) or possibly the tubehead.

B4.3 Arm Adjustment

NOTE: It is not necessary to dismantle the tubehead to adjust the arms. If you think that this operation is useful or necessary, before removing the tubehead put the scissors arm in the closed position and secure it using the safety clamp to prevent harming people or the arm itself.

The arms may need adjusting in the following cases:

- The movement of the extension arm combined with the scissors arm is not considered to be ergonomic by the end user; in this case it will be necessary to adjust the extension arm friction mechanism.
- The scissors arm is not perfectly balanced; in this case you must adjust the springs.

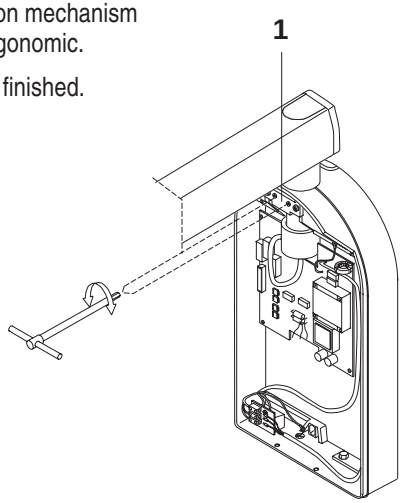
B4.3.1 Adjusting the extension arm support friction mechanism

The device to adjust the arm support frictioning mechanism is located on the front of the wall support. To make this adjustment you must proceed as follows:

1. Remove the plastic timer cover by loosening the two screws placed on the lower part of the wall plate. Lift the plastic cover from the bottom and push it upwards to release it from the upper stops.

2. Using a 2 mm allen wrench, adjust the friction mechanism screws (**1**) until the movement of the arm is ergonomic.

3. Reposition the plastic cover when you have finished.

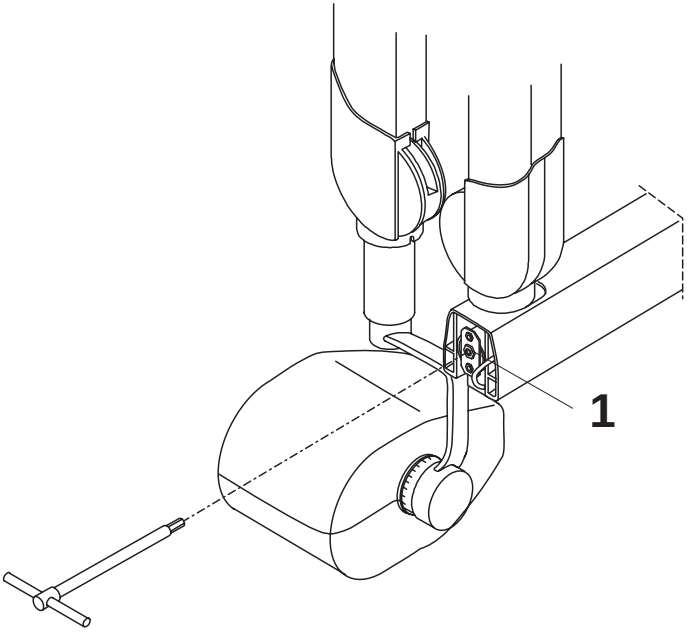


B4.3.2 Adjusting the extension arm friction mechanism

1. Remove the small front extension arm cover, working carefully.

2. Adjust the friction mechanism (**1**) using a 4 mm allen wrench while checking the rotation of the scissors arm.
NOTE: The purpose of this friction mechanism is to prevent the scissors from becoming detached, so it must not be loose.

3. Assemble the cover again.



B4.3.3 Adjusting the scissors arm balance

• Adjusting the second arm

Proceed as follows to adjust the scissors arm:

Adjusting the friction (for small corrections - picture A)

1. Put the arm in a horizontal position; remove the plastic coordinator covers. This must be done carefully to avoid breaking the covers.
2. Using a 2.5 mm allen wrench, loosen the dowel (1).
3. Using two 13 wrenches, adjust the frictioning mechanism by rotating one of the wrenches ¼ of a turn each time.
4. When you have finished the adjustment, tighten the previously loosened dowel and reassemble the plastic covers.

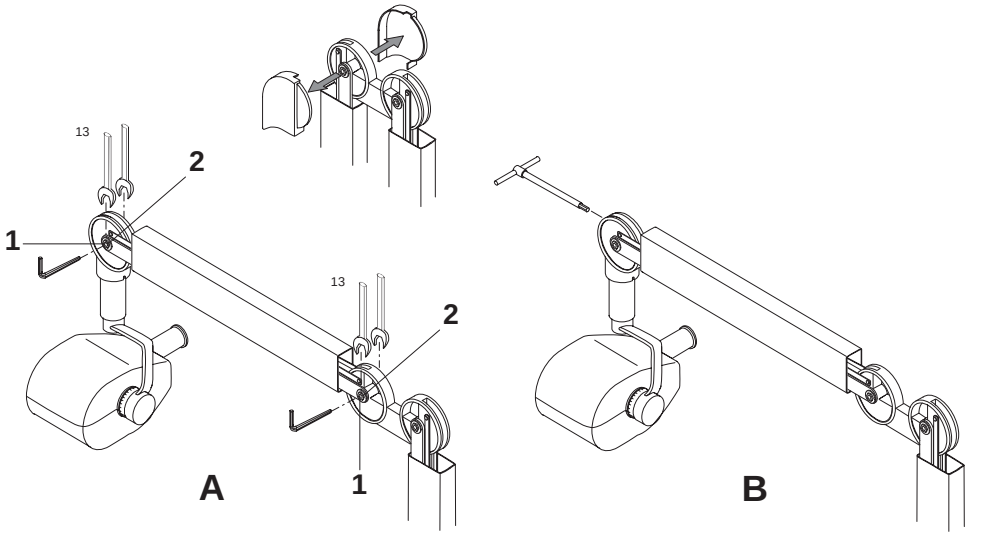
Adjusting the spring (picture B)

If adjustment of the friction is not enough, you can adjust the spring to optimize the balance:

1 Put the arm in a horizontal position; remove the plastic coordinator covers. This must be done carefully to avoid breaking the covers.

2 Insert a 6 mm allen wrench (about 200mm long –contained in the kit P/N 6661209900). This wrench must rotate clockwise if the arm tends to go down compared to the release position; anticlockwise if it tends to go up.

3 When you have finished the adjustment, reposition the plastic covers.



B4.3.3 Adjusting the scissors arm balance

• Adjusting the first arm

If the first arm also needs to be adjusted:

Adjusting the friction (for small corrections - picture A)

1 Close the arm scissors arm; remove the plastic co-ordinator covers. This must be done carefully to avoid breaking the covers.

2 Using a 2.5 mm hexagon wrench, loosen the dowel (**1**).

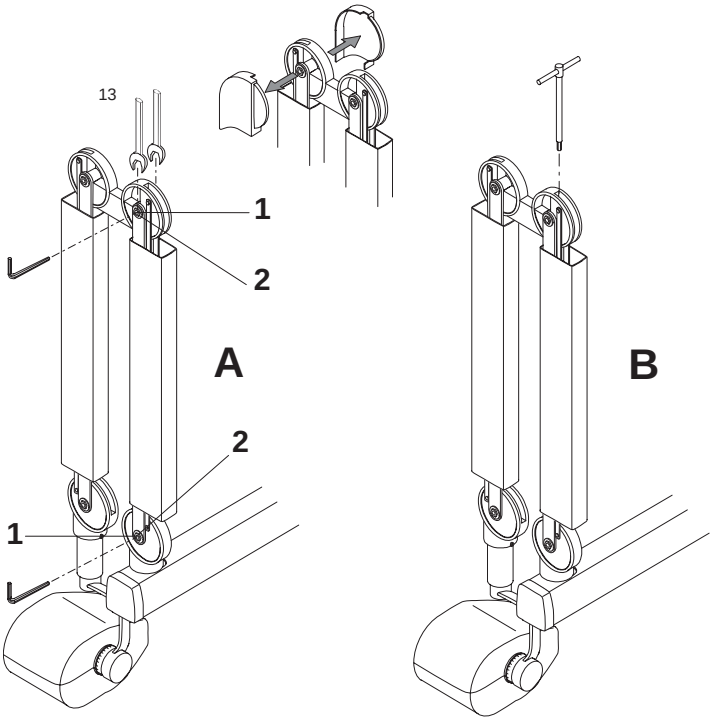
3 Using two 13 wrenches, adjust the frictioning mechanism by rotating one of the wrenches ¼ of a turn each time.

4 When you have finished the adjustment, tighten the previously loosened dowel and reassemble the plastic covers

Adjusting the spring (picture B)

If adjustment of the friction is not enough, you can adjust the spring to optimize the balance:

1. Put the arm in a horizontal position; remove the plastic coordinator covers. This must be done carefully to avoid breaking the covers.
2. Insert a 6 mm allen wrench (about 200mm long – contained in the kit P/N E6661209900). This wrench must rotate clockwise if the arm tends to go down compared to the release position; anticlockwise if it tends to go up.
3. When you have finished the adjustment, reposition the plastic covers



B5. Parts
B5.1. Electrical

REF	*DESCRIPTION*	*P/N*
1	COVER, COMPLETE	897-CV546132
2	SCREW FOR COVER (2)	E2100110500
3	MAIN ON/OFF SWITCH	E4291415900
4	HAND-HELD CONTROLLER WITH CABLE	897-ZZ0145061
5	HAND-HELD CONTROLLER CABLE	897-PC1908270
6	TIMER BOARD (120V)	897-ZZ0145062
7	TIMER BOARD (230F)	897-ZZ0145060
8	FUSE (F4) T10A SLOW BLOW (120V)	897-FU0001007
9	FUSE (F4) T6.3A SLOW BLOW (230V)	897-FU0001014
10	HORIZONTAL FUSE HOLDER	897-FU1001000
11	FUSE (F1) T6.3A SLOW BLOW (230V)	897-FU0001017
12	FUSE (F1) T10A SLOW BLOW (120V)	897-FU0001007
13	VERTICAL FUSE HOLDER	897-FU1003000

B5. Parts
B5.2. Electro-Mechanical

REF	*DESCRIPTION*	*P/N*
1	SCISSORS ARM	9992700610
2	STANDARD EXTENSION ARM - 31.5” (80CM)	9992700603
3	OPTIONAL MEDIUM EXTENSION ARM - 23.625” (60 CM)	9992700602
4	OPTIONAL SHORT EXTENSION ARM - 11.813” (30 CM)	9992700601
5	TUBEHEAD (120V)	9992700611
6	TUBEHEAD (230V)	9992702011
7	KIT, WALL MOUNTING PLATE	9992700112
8	GROUND CLIP (FOR TUBEHEAD)	897-000137
9	KIT, EXTENSION ARM END COVER	E6661210300
10	TUBEHEAD RETAINER CLIP	897-5160402800
11	GRADUATED SCALE (FOR ANGULATION DIAL ON TUBEHEAD)	E5160423800

B6. Mobile Stand P/N 9992700110

Assembly and Maintenance Instructions
Description

The AFP Image-Vet 70*ACP* Mobile Stand is constructed of steel and coated with abrasion resistant epoxy paint. It consists of a rolling base assembly and vertical support column. Four wheels attached to the base allow free movement of the system between locations. The scissors arm with tubehead and x-mind timer are mounted at the top of the vertical support. Screws, located in the top of the support act as stops to limit the range of movement of the scissors arm to an area extending over the base legs. This lends stability to the unit. CAUTION: Never attempt to operate the unit with the scissors arm extended in the direction opposite the legs.

The vertical post is bolted through the base assembly and is positioned by a roll pin inserted between the base and the vertical support. A power cable and handle are provided.

Assembly

Base

Refer to Figure 1 for the following:

1) Using a flat surface, lay out the base legs (Items 1 and 2) as shown with the castors facing up and the counter-bored holes for the bolts facing outward. NOTE: One left handed and one right handed leg. Castors are not shown in the illustration.

2) Place the support plate (Item 3) between the two base legs as shown. NOTE: The top side with two holes about center should face down.

3) Insert the four (4) bolts and washers (Items 4 and 5) through the base leg holes and screw into the corresponding holes in the support plate using the Allen key provided. Make sure they are tightened firmly.

4) Turn over assembly so the castors are on the floor.

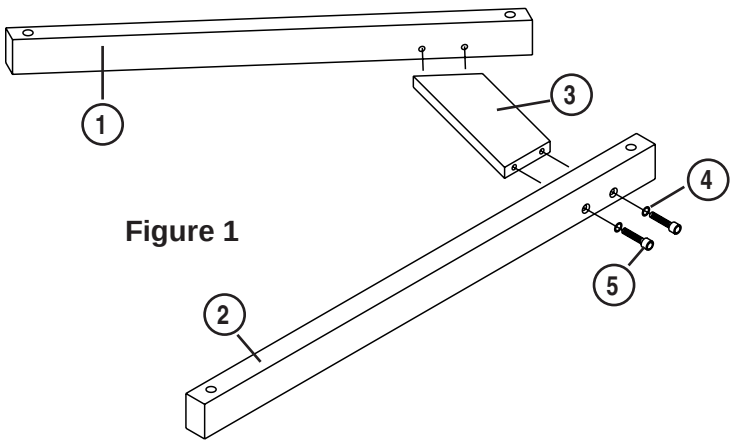


Figure 1

Assembly (Cont'd)

Main Unit

Using the allen key provided, fasten the vertical support column to the base assembly with the bolt and lock-washer provided, making sure that the locator roll pin is inserted into both the base and the support column. Refer to **Figure 2** for the following: Insert the cable from the scissors arm through the bushing (1) at the top of the vertical support column and out through the hole (TIP - Fold the cable over first, then insert the folded part down through the bushing to lend rigidity). Attach the plastic mounting plate provided AND X-Mind timer assemby to the top of the column using the two allen head bolts and lockwashers provided while making sure that the scissors arm and main power cables are routed through the hole in the plate. Route the main power cable down (underneath the PC board) and forward at the bottom of the unit. Route the scissors arm cable up (underneath the PC board) and forward at the top of the unit.

Make sure that both the pin of the scissors arm and bushing of the vertical support are clean. Apply a small amount of graphite based grease to the pin. Gently lower the pin and scissors arm down into the bushing. Make sure that it rotates easily. CAUTION: Never operate the unit with the scissors arm extended in the direction opposite the legs.

Carry out the electrical connections in accordance with the instructions in sections B1.4. (Electrical Requirements) and B2.2.2. (Electrical Wiring) in this manual. Fasten the timer cover. Attach the handle with 2 allen head bolts.

Refer to section B2.1.4. for attaching the tubehead.

To remove the tubehead, return the positioning arm to the upper position, raise the plastic cover and remove the retainer clip (see Figure 3). Then slide the tubehead out of the connector.

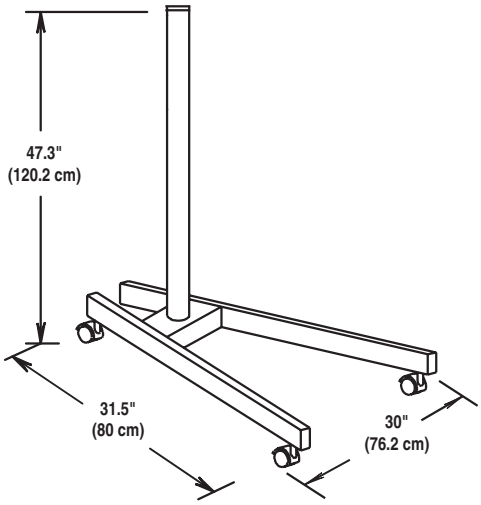
Warning: To avoid possible injury or sudden movement of the positioning arm, always remove the tubehead while the forearm section of the positioning arm is in the horizontal position. Refer to Sections B2.1.3. in this manual.

Cleaning and Maintenance

For external cleaning use a soft cloth with warm water and mild soap.

Once a year, lubricate pin (P) and bushing (M) in the following way:

1) Switch off the power supply.
2) Unplug the cable (G) from the wall outlet.
3) Remove the Tubehead.
4) Raise the scissors arm just enough to expose the pin and bushing. Have an additional person hold the arm while performing the next step.
5) Remove old grease and dirt from the pin and bushing with a soft cloth and re-lubricate with MOLIKOTE D or equivalent. Lower the arm back into the bushing.
6) Check the wheels and clean if necessary in order to insure that the unit rolls smoothly.
7) Check the wheel locks.



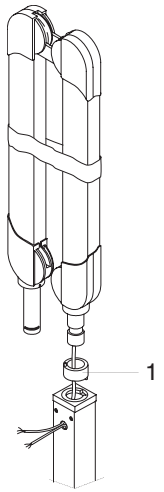


Figure 2

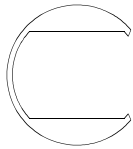
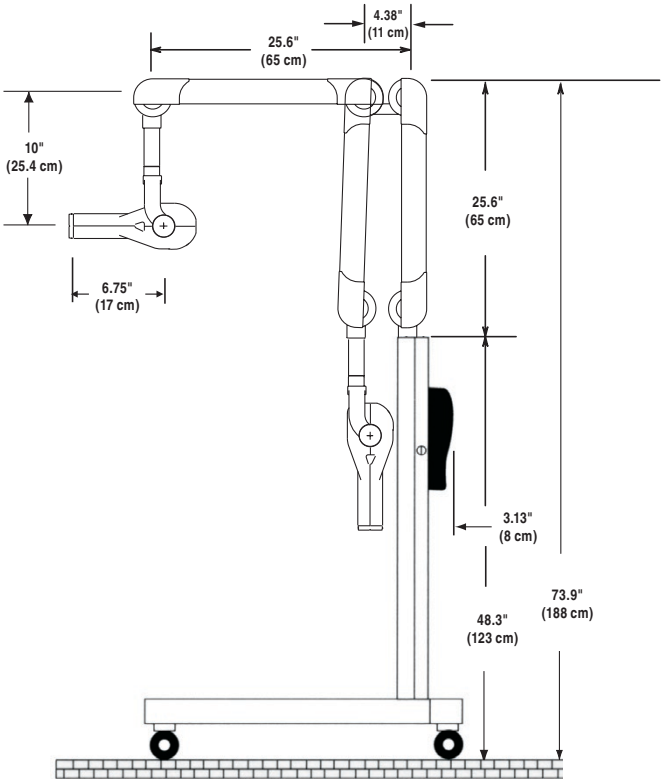


Figure 3

Retainer clip for attaching the tubehead to the scissors arm.



Visionary Imaging

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